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Gender Differences in Predictors of Quality of Life at the Initiation of Radiation Therapy

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Abstract

Purpose/objectives—Evaluate for gender differences in quality of life (QOL), demographic, clinical, and symptom characteristics.

Design—Prospective, observational.

Setting—Two radiation oncology departments in northern California.

Sample—185 oncology patients before initiation of radiation therapy (RT).

Methods—At their RT simulation visit, patients completed a demographic questionnaire, a measure of QOL, and symptom-specific scales. Backwards elimination regression analyses were done to determine the significant predictors of QOL.

Main Research Variables—QOL, gender, and 20 potential predictors.

Findings—In women, depressive symptoms, functional status, age, and having children at home explained 64% of the variance in QOL. In men, depressive symptoms, state anxiety, number of comorbidities, being non-white, and age explained 70% of the variance in QOL.

Conclusions—Predictors of QOL differed by gender. Depressive symptom score was the greatest contributor to QOL in both genders.

Implications for Nursing—Nurses need to assess for QOL and depression at the initiation of RT. Knowledge of the different predictors of QOL may be useful in the design of gender-specific interventions to improve QOL.

Keywords

quality of life; gender differences; cancer patients; depression; anxiety; radiation therapy

Introduction

Decreases in quality of life (QOL) are associated with patients' responses to their disease and its treatment and can have a negative impact on survival (Efficace et al., 2006; Gotay, Kawamoto, Bottomley, & Efficace, 2008). For these reasons, QOL is one of the most important patient reported outcomes in clinical practice and research (Trask, Hsu, & McQuellon et al., 2009.). Many demographic and clinical characteristics can impact QOL, including gender, age, race, education, marital status, social support, income, one's ability to function in multiple domains (e.g., physical, psychological, cognitive, social, or spiritual) (Brix et al., 2008; Buchholz et al., 2014; Cherepanov, Palta, Fryback, & Robert, 2010; Hagelin, Seiger, & Fürst, 2006; Heo, Lennie, Moser, & Kennedy, 2014; Juul et al., 2014; Krouse et al., 2009; Lee, et al., 2011; Lopez-Espuela et al., 2014; Luncheon & Zack, 2012; Mielck, Vogelmann, & Leidl, 2014; Mor, Allen, & Malin, 1994; Osann et al., 2014; Parker, Baile, de Moor, & Cohen, 2003; Pashos et al., 2013; Paxton et al., 2012; Popovic et al., 2013; Powe et al., 2007; Quittner et al., 2010; Roland, Rodriguez, Patterson, & Trivers, 2013; M. Smith, Cho, Salazar, & Ory, 2013; Wan, Counte, & Cella, 1997; Wong et al., 2013; Zimmerman et al., 2011), as well as many disease-specific characteristics, number and severity of comorbidities, number and severity of symptoms, illness severity, and prognosis (Hagelin et al., 2006; Hopman et al., 2009; Jordhey et al. 2001; Juul et al., 2014; Miaskowski et al., 2014; Zimmerman et al., 2011).

Several population-based studies (Cherepanov et al., 2010; Hinz, Singer, & Brähler, 2014; Juul et al., 2014; Mielck, Vogelmann, & Leidl, 2014), as well as studies across a number of chronic conditions, including cancer (Bushnell et al., 2014; Dodd et al., 2011; Heller, Dogan, Schulz, & Reetz, 2014; Hjermstad, Fayers, Bjordal, & Kaasa, 1998; Heo et al., 2014; Hopman et al., 2009; Krouse et al., 2009; Lisspers, Ställberg, Janson, Johansson, & Svärdsudd, 2013; Hagelin et al., 2006; Miaskowski et al., 2014; Osann et al., 2014; Pashos et al., 2013; Pud, 2011; M. Smith et al., 2013; Zimmermann et al., 2011), have reported gender differences in QOL, with women usually reporting a lower QOL than men in at least one of the domains assessed. These differences hold true across different measures of QOL and when controlling for age, income, and disease severity (Cherepanov et al., 2010; Hopman et al., 2009; Zimmermann, 2011).

The reasons for these gender differences are not completely understood. However, they may be related to differences in responses to disease and its treatment; differences in perceptions and reporting of symptoms; and differences in gender roles and societal expectations (Izadnegahdar, Norris, Kaul, Pilote, & Humphries, 2014; Norris, Murray, Triplett, & Hegadoren, 2010; Zimmerman et al, 2011). Given these differences, the characteristics that

predict QOL in women and men are likely to be different. Greater understanding of these characteristics would assist clinicians to identify patients at greater risk for a poorer QOL and implement gender-specific interventions to maintain or improve the patient's QOL.

Only one study was identified that evaluated for gender differences in the predictors of QOL in cancer patients (Pud, 2011). In that study of 114 adult outpatients (n=80 women, 34 men) who were receiving “over two cycles of active treatment” (p. 487), a separate stepwise linear regression was done for each gender to determine the effects of pain, fatigue, and depression on QOL. For the female patients, pain intensity and depression, but not fatigue predicted total QOL scores and explained 58% of the variance in QOL. For the male patients, only depression predicted the total QOL score and explained 39% of the variance in QOL. Although it is the only previous study to explore gender differences in the predictors of QOL, the study is limited by the small number of men in the sample and evaluation of only a small number of symptoms as predictors.

Given the paucity of research on gender differences in QOL and the knowledge that many demographic and clinical characteristics can influence QOL, the purposes of this study, in a sample of male (n=96) and female (n=89) oncology patients who were assessed prior to the initiation of radiation therapy (RT), were to evaluate for gender differences in subscale and total QOL scores as well as in the demographic, clinical, and symptom characteristics that predicted total QOL scores.

Methods

Conceptual Framework

The UCSF Symptom Management model was used as the conceptual framework for the entire study. An evaluation of QOL is a major outcome in this framework (Dodd et al., 2001).

Patients and Settings

This study is part of a larger descriptive longitudinal study that evaluated multiple symptoms in patients who underwent primary or adjuvant RT. The methods are described in detail elsewhere (Dunn et al., 2013; Miaskowski et al., 2011). In brief, patients were recruited from two RT departments located in a Comprehensive Cancer Center and a community-based oncology program at the time of the patient's simulation visit. Patients were eligible to participate if they were 18 years of age; were scheduled to receive primary or adjuvant RT for one of four cancer diagnoses (i.e., breast, prostate, lung, brain); were able to read, write, and understand English; gave written informed consent; and had a Karnofsky Performance Status (KPS) score of 60. Patients were excluded if they had: metastatic disease; more than one cancer diagnosis; or a diagnosed sleep disorder.

Instruments

The demographic questionnaire obtained information on age, gender, marital status, education, ethnicity, and employment status. Patients rated their functional status using the KPS scale that ranged from 30 (I feel severely disabled and need to be hospitalized) to 100

(I feel normal; I have no complaints or symptoms) (Karnofsky, Abelmann, Craver, & Burchenal, 1948; Karnofsky, 1977). Patients indicated the presence of comorbidities from a list of 26 common medical conditions.

Patients were asked if they had pain during the past week, and if so, they rated the intensity of their average and worst pain using a numeric rating scale (NRS) that ranged from 0 (no pain) to 10 (worst imaginable pain). Patients who reported “yes” to the presence of pain completed the eight interference items from the Brief Pain Inventory (BPI), which are rated on a 0 (does not interfere) to 10 (completely interferes) NRS. The BPI (which included the pain intensity NRS) is a valid and reliable measure to evaluate pain intensity and pain's level of interference with function (Jensen, 2003).

The Lee Fatigue Scale (LFS) consists of 18 items designed to assess physical fatigue and energy (Lee, Hivks, & Nino-Murcia, 1991). Each item was rated on a 0 to 10 NRS. Total fatigue and energy scores were calculated as the mean of the 13 fatigue items and the 5 energy items, with higher scores indicating greater fatigue severity and higher levels of energy. Respondents were asked to rate each item based on how they felt “right now,” within 30 minutes of awakening (i.e., morning fatigue, morning energy) and prior to going to bed (i.e., evening fatigue, evening energy). The LFS has been used with healthy individuals (Gay, Lee, & Lee, 2004; Lee et al., 1991) and in patients with cancer and HIV (Lee, Portillo, & Miramontes, 1999; Miaskowski et al., 2006; Miaskowski and Lee, 1999; Miaskowski et al., 2008). Cutoff scores of 3.2 and 5.6 indicated high levels of morning and evening fatigue, respectively (Fletcher et al., 2008). Cutoff scores of 6.0 and 3.5 indicate low levels of morning and evening energy, respectively (Lee et al., 1999; Miaskowski et al., 2006; Miaskowski and Lee, 1999; Miaskowski et al., 2008). In this study, Cronbach's alphas for evening and morning fatigue scales at enrollment were 0.96 and 0.95, respectively. Cronbach's alphas for evening and morning energy scales were .95 and .95, respectively.

The Attentional Function Index (AFI) consists of 16-items designed to measure attentional function at the present time in patients with cancer. Each item is rated on a 0 to 10 NRS. A mean AFI score was calculated, with higher scores indicating greater capacity to direct attention (Cimprich, 1992; Cimprich, Visovatti, & Ronis, 2011). Based on a previously conducted analysis of the frequency distributions of AFI scores, attentional function can be grouped into low (i.e., patients who score <5.0), moderate (i.e., patients who score 5.0 to 7.5), and high (i.e., patients who score >7.5) functioning (Cimprich, So, Ronis, & Trask, 2005). The AFI has well-established reliability and validity (Cimprich 1992; Jansen, Dodd, Miaskowski, Dowling, & Kramer, 2008). In the current study, Cronbach's alpha for the AFI was 0.95.

The General Sleep Disturbance Scale (GSDS) consists of 21 items designed to assess the quality of sleep in the past week. Each item was rated on a 0 (never) to 7 (everyday) NRS. The GSDS total score can range from 0 (no disturbance) to 147 (extreme sleep disturbance). A total score of 43 indicates a significant level of sleep disturbance (Fletcher et al., 2008). The GSDS has well-established validity and reliability in shift workers, pregnant women, cancer, and HIV patients (Lee, 1992; Lee & DeJosphe, 1992; Miaskowski and Lee, 1999). In the current study, the Cronbach's alpha for the GSDS total score was 0.84.

The Spielberger Trait Anxiety Inventory (STAI-T) and State Anxiety Inventory (STAI-S) consist of 20 items each that are rated from 1 to 4. The scores for each scale are summed and can range from 20 to 80. A higher score indicates greater anxiety. The STAI-T measures an individual's predisposition to anxiety determined by his/her personality and estimates how a person generally feels. The STAI-S measures an individual's transitory emotional response to a stressful situation. Cutoff scores of 31.8 and 32.2 indicate high levels of trait and state anxiety, respectively. The STAI-T and STAI-S inventories have well established validity and reliability (Bieling, Antony, & Swinson, 1998; Kennedy, Schwab, Morris, & Beldia, 2001; Spielberger, Grosch, Lushene, Vagg, & Jacobs, 1983) the current study, the Cronbach's alphas for the STAI-T and STAI-S were 0.92 and 0.95, respectively.

The Center for Epidemiological Studies-Depression scale (CES-D) consists of 20 items selected to represent the major symptoms in the clinical syndrome of depression as experienced over the past week. Scores can range from 0 to 60, with scores of 16 indicating the need for individuals to seek clinical evaluation for major depression. The CES-D has well established concurrent and construct validity (Carpenter, Andrykowski, & Wilson, 1998; Radloff, 1977; Sheehan, Fifiield, & Reisine, 1995). In the current study, the Cronbach's alpha for the CES-D was 0.88.

Quality of life was measured using the Multidimensional Quality of Life Scale-Patient Version (MQOLS-PV) (Padilla et al., 1983; Padilla, Ferrell, Grant, & Rhiner, 1990). The MQOLS-PV is a 41-item instrument that measures four dimensions of QOL (i.e., physical well-being, psychological well-being, social well-being, spiritual well-being) experienced at the present time in cancer patients as well as a total QOL score. Each item is rated on a 0 to 10 NRS with higher scores indicating a better QOL. The MQOLS-PV has established validity and reliability (Ferrell, 1995; Ferrell, Dow, & Grant, 1995; Padilla et al., 1983; Padilla, Ferrell, Grant, & Rhiner, 1990). In the current study, the Cronbach's alpha for the MQOLS-PV total score was 0.94. In this study, the total QOL score, which is a mean of the 41 items, was used in subsequent analyses.

Study Procedures

The study was approved by the Committee on Human Research at the University of California, San Francisco and by the institutional review board at the second site. At the time of the simulation visit (i.e., approximately one week prior to the initiation of RT), patients were approached by a research nurse to discuss participation in the study. After obtaining written informed consent, patients completed the enrollment questionnaires. Medical records were reviewed for disease and treatment information. Of 472 patients approached, 185 consented to participate (39.2% response rate). The major reasons for refusal were being too overwhelmed with their cancer experience or too busy. No differences were found in any demographic or clinical characteristics between patients who did and did not choose to participate.

Data analysis

Data were analysed using SPSS Version 22 (IBM Corp., New York). Descriptive statistics and frequency distributions were generated on the sample characteristics. Independent

samples t-tests and Fisher's exact analyses were done to evaluate for gender differences in demographic, clinical and symptom characteristics, as well as subscale and total QOL scores. Pearson's correlations were performed separately for each gender group to examine the relationships between total QOL score and 20 selected demographic, clinical, and symptom characteristics. These characteristics were selected based on research evidence and the authors' clinical experience and included: age, education, KPS score, race (with white as the referent), lives alone, marital status, number of comorbid conditions, working for pay, caring for children at home, caring for an older parent at home, trait anxiety score, state anxiety score, CES-D score, morning and evening fatigue scores, morning and evening energy scores, total AFI score, total GSDS score, and the presence of pain. All of these characteristics were entered into separate backwards elimination regression analyses for each gender group to determine predictors of the total QOL score.

Results

Gender differences in demographic and clinical characteristics

Gender differences in demographic and clinical characteristics at enrollment are listed in Table 1. Women were significantly younger and had a lower KPS score. In addition, a higher percentage of women lived alone, were not married or partnered, and had children living at home.

Gender differences in symptom and QOL scores

Gender differences in symptom and QOL scores are shown in Table 2. Women reported significantly higher state and trait anxiety, depressive symptoms, sleep disturbance, and evening and morning fatigue scores, as well as lower morning energy and attentional function scores. In addition, more women reported having pain and, except for the spiritual well-being subscale score, women reported lower subscale and total MQOLS-PV scores.

Gender differences in predictors of QOL

The final predictive models for the total MQOLS-PV score for women and men are displayed in Tables 3 and 4, respectively. The total percentage of explained variance in QOL was large for both women (64%) and men (70%). The actual predictors of QOL and their unique contributions to the variability in QOL differed by gender. Women who were younger, had lower KPS scores, were not caring for children at home, and had higher depressive symptom scores had lower total MQOLS-PV scores. The depressive symptom score made the largest independent contribution to the explained variance in the women's QOL score at 20%.

Men who were younger and non-white, had more co-morbidities, higher state anxiety scores, and higher depressive symptom scores had lower total MQOLS-PV scores. The depressive symptom score made the largest independent contribution to the explained variance in the men's QOL score at 8.9%, followed by state anxiety at 7%.

Discussion

To our knowledge, this study is the first to examine gender differences in the predictors of QOL of oncology patients using a broad array of demographic, clinical, and symptom characteristics in a relatively large sample of men and women. Consistent with previous reports (Cherepanov et al., 2010; Dodd et al., 2011; Hagelin et al., 2006; Hjermstad et al., 1998; Juul et al., 2014; Miaskowski et al., 2014; Pud, 2011; Zimmermann et al., 2011), women reported significantly lower physical, psychological, and social subscale as well as total QOL scores.

For both gender groups, the regression models explained a large amount of the variance in total QOL scores. While age and CES-D score were the two characteristics retained in the final models for both genders, the CES-D score in women explained the largest amount of the variance in their total QOL scores (i.e., 20%), but contributed only 8.9% to the men's total QOL scores. Our findings are consistent with Pud (2011), who found that depression made the largest independent contribution to the amount of explained variance in QOL in both genders. However, in contrast with our study, she found that the CES-D score explained a greater percentage of the total variance in QOL in men (i.e., 39%) than women (33%). This difference may be explained partially by the fact that her sample of men was relatively small (n=34), her CES-D scores were considerably higher in both gender groups than ours, and she entered only two predictors into her regression models. Our group and many others have reported that higher depressive symptoms were associated with a lower QOL (Bower, 2008; Brown & Roose, 2011; Dodd et al., 2011; Dunn et al., 2011; Fann et al., 2008; Miaskowski et al., 2014; Osann et al., 2014; Pud, 2011; Pulgar, Alcala, & Reyes del Paso, 2013; Roland et al., 2013) and other adverse outcomes, including reduced adherence to treatment and other health behaviors (DiMatteo, Lepper, & Croghan, 2000) and increased perception of pain and other symptoms (Dunn et al., 2011; Fann et al., 2008; Gaston-Johanssen, Ohly, Fall-Dickson, Nanda, & Kennedy, 1999; Huang, Chen, Liang, & Miaskowski, 2014). Our findings reinforce the need for clinicians to assess for and treat depressive symptoms in cancer patients at the beginning RT.

Age accounted for over twice the explained variance in the QOL in women as compared with men in our sample, which is consistent with other population-based (Cherepanov et al., 2010; Hjermstad et al., 1998; Juul et al., 2014) and clinical studies (Pashos et al., 2013; Zimmerman et al., 2011) that found that even as men age, they report better QOL than women.

Interestingly, in our study, older age predicted higher QOL in both gender groups, which is consistent with previous findings in a variety of clinical populations (Brown & Roose, 2011; Hopman et al., 2009; McNaughton et al., 2001), including cancer patients (Hagelin et al., 2006; Mor et al., 1994; Pashos et al., 2013; Popovic et al., 2013; Roland et al., 2013; Wan et al., 1997; Wong et al., 2013; Zimmerman et al., 2011). The explanation for this finding is unclear, but could be due to the fact that older people are less likely than younger people to have family and job responsibilities, which may partially lessen the trauma and burden of a potentially life-threatening illness (Mor et al., 1994). Other possible explanations for the higher QOL in older people are that older people may be receiving less aggressive treatment;

they may have more coping strategies and resources to be able to manage a long-term, life-threatening illness (Leak et al., 2013; Wenzel et al., 1999); and they may experience a “response shift” in their reports of QOL in such a way that they are more accepting of changes in function and symptoms (Jiao, Vincent, Cha, Luedtke, & Oh, 2014; Wan et al., 1997). Additional studies are needed to clarify the relationships between older age and QOL.

Caring for children at home was a unique predictor of a better QOL in the women, contributing 3.8% of the total variance. Caring for children may help buffer some of the QOL impact of coping with cancer and its treatment, possibly by providing a sense of purpose. It is also possible that having children at home is a marker of social support more broadly. However, in an earlier analysis (Dhruva et al., 2010) of the breast cancer subset of this sample, we found that caring for children at home predicted higher levels of evening fatigue at the initiation of RT in the subset of women with breast cancer in this sample. It is clear that the relationship of caring for children at home with women's QOL and fatigue is a complex one and further studies are needed to clarify it.

The unique predictors of poorer total QOL scores in the men were being non-white, having a higher number of comorbidities, and higher state anxiety. The association of non-white race with poorer QOL is consistent with other population-based (Luncheon & Zack, 2012) and clinical studies (Paxton et al., 2012; Powe et al., 2007; Quittner et al., 2010; M. Smith et al., 2013). This relationship may be related to multiple factors, including lower income; limited access to and culturally appropriate health care; advanced stages of cancer at the time of diagnosis; higher levels of stress; differences in health behaviours; and differences in perceptions of chronic illness (Powe et al., 2007; Quittner et al., 2010; M. Smith et al., 2013).

Consistent with a population-based study (Juul et al., 2014) as well as studies of patients with chronic medical conditions (Heo et al., 2014; Hopman et al., 2009; Lopez-Espuela et al., 2014; M. Smith et al., 2013), a higher number of comorbidities was associated with poorer QOL in the male patients in this study. Surprisingly, the number of comorbidities in the women in our sample was not significantly different from the men, but this characteristic was not associated with QOL in the women. Since the men's functional status was in the highly functional range (i.e., KPS score >90) and significantly higher than the women's in this study, the effect of comorbidities on men's QOL may have been mediated through their state anxiety or depressive symptoms, or some other characteristics that were not measured. An analysis of differences in the specific comorbid conditions reported by men and women found that the only differences were that a higher proportion of women had kidney, bladder or urinary problems; skin problems such as psoriasis and eczema; and osteoporosis.

State anxiety as a predictor of poorer QOL in the men is somewhat surprising in that the men's STAI-S scores did not exceed the clinically meaningful cutoff score for state anxiety. However, the correlation coefficient for state anxiety in the regression model was -.69, which indicates a fairly strong negative association with QOL. Also, the men's trait and state anxiety scores were significantly lower than the women's, yet anxiety did not contribute to the explained variance in QOL in the women. The reasons for this paradox are unclear, but may be explained partially by the fact that men often under-report the occurrence and

severity of anxiety (Egloff & Schmukle, 2004; Feingold, 1994), and it is possible that the expression of anxiety may be demonstrated in their lower QOL. Larger studies would confirm or refute this finding.

A number of demographic, clinical, and symptom characteristics did not predict QOL in either the men or women, though bivariate analysis indicated a number of significant differences between the gender groups. A lower percentage of women were married or partnered, and a higher proportion lived alone. These two findings suggest that women in our study experience less social support, which was associated with a lower QOL by others (Brix et al., 2008; Osann et al., 2014; Parker et al., 2003; Roland et al., 2013). In addition, when we compared responses to the single item that assesses social support on the MQOLS-PV (i.e., "Is the amount of support you receive from others sufficient to meet your needs?"), women reported a significantly lower score on this item than the men (8.4 ± 2.1 vs. 9.0 ± 1.6 , respectively; $p=0.030$), which suggests that they perceived an inadequate amount of social support. A more specific measure of social support would provide insights into this characteristic in future studies.

When compared with men, the women's symptom profile was significantly worse, though neither gender group exceeded the cutoff scores for most of the symptom scales. The exceptions were that women scored below the clinically meaningful cutoff for morning energy (indicating low morning energy levels) and slightly exceeded the cutoff scores for sleep disturbance and trait and state anxiety. The women's lower level of morning energy may be explained partially by their higher levels of sleep disturbance.

Interestingly, neither morning nor evening fatigue scores predicted QOL in either gender group. In contrast, using the same fatigue measure as we did, Pud (2011) found that higher levels of fatigue were associated with poorer QOL in women but not in men. However, a direct comparison between these findings cannot be made because Pud did not evaluate for diurnal variation in fatigue severity, while we evaluated fatigue severity upon awakening and before going to bed. The reason fatigue did not predict QOL in this study may be due to the relatively low levels of morning and evening fatigue reported by our patients prior to the initiation of RT.

Neither gender group exceeded the clinically meaningful cutoff score for the CES-D. However, the women's mean score (12.4 ± 9.4) approached the cutoff of 16 which suggests a subsyndromal level of depressive symptoms (i.e., depressive symptoms below the threshold for depression; Dunn et al., 2013). Subsyndromal depression was associated with lower functional status, higher state and trait anxiety (Dunn et al., 2011) and lower QOL (Das-Munchi et al., 2008; Forsell, 2007; Judd, Paulus, Wells, & Rapaport, 1996). Interestingly, while the men's mean CES-D score (7.1 ± 7.2) was considerably lower, it did predict QOL in this group as well. A post hoc analysis found that 11% of the men and 35.6% of the women had CES-D scores ≥ 16 .

Both groups reported a moderate level of attentional function. In addition, more women reported having pain, although no differences in average or worst pain or pain interference scores were found between men and women. Many studies reported that women report

higher occurrence rates and higher severity scores for a variety of common symptoms associated with cancer and its treatment (Dodd et al., 2011; Grant et al., 2011; Hagelin et al., 2006; Miaskowski et al., 2014; Zimmerman et al., 2011).

Limitations of this study include that the primary reasons for patients' refusal to participate were being overwhelmed with their cancer experience or too busy. While no differences were found in any demographic or clinical characteristics between patients who did and did not choose to participate, one can speculate that the patients who refused were experiencing more severe symptoms with worse functional status and poorer QOL, which could have been differentially distributed across the genders and altered the predictors of QOL in this study.

Because 88% of the women in this sample had breast cancer and 85% of the men had prostate cancer, this study could not determine whether the differences in the predictors of QOL were due to gender and not cancer diagnosis. Future research will need to determine the answer to this question using cancer diagnoses that occur in both men and women. Since the sample was primarily white and well-educated, the findings can be generalized only to this population. Because previous studies found that race and education are predictors of QOL (Luncheon & Zack, 2012; Mielck et al., 2014; Paxton et al., 2012; Powe et al., 2007; Quittner et al., 2010; M. Smith et al., 2013), future studies need to examine gender differences in the predictors of QOL in larger, more racially and educationally diverse samples. In addition, we did not collect data on the medications patients were taking for their symptoms. Therefore, it is possible that symptom severity scores were affected by medications, and may have diminished their effect on QOL. Although a large amount of the total variances in QOL were explained in this study, 36% of the variance in women and 30% of the variance in men remained unexplained. Future studies need to explore additional variables that could impact QOL differentially across the genders, such as gender roles (Norris et al., 2010), optimism, coping and adjustment (Chambers et al., 2011; Roland et al., 2013), resilience (Strauss et al., 2007), and social support.

Conclusions and Implications for Nursing Practice

Despite these limitations, this study is the first to evaluate for gender differences in the predictors of QOL using a broad array of demographic, clinical, and symptom characteristics. The percentage of explained variance in QOL was large for both women and men. The actual predictors of QOL and their relative contributions to the variability in QOL differed by gender. Women who were younger, had lower KPS scores, had no children at home, and reported higher levels of depressive symptoms reported a lower total QOL. Depression made the largest independent contribution to the total amount of explained variance in the women's QOL. Men who were younger and non-white, had more co-morbidities, higher state anxiety, and more depressive symptoms had lower total QOL scores. Depression made the largest independent contribution to the total amount of explained variance in the men's QOL, followed by state anxiety.

QOL and the predictors noted above should be included in the nurse's initial assessment of patients at the beginning of RT. For clinical purposes, patients' QOL can be assessed by whatever instrument is used in the setting or by using the single item from the Edmonton

Symptom Assessment System (Bush et al., 2010). This item asks the patient to rate their sense of well-being using a 0-10 scale where zero indicates “best ‘feeling of well-being’” (Bush et al., p.566) and 10 represents “the worst possible ‘feeling of well-being’” (Bush et al., p.566).

A tool specific for depression should be administered to all patients, either one that is currently used in the setting or another, such as the CES-D, with appropriate referral for further evaluation and treatment, if needed. Similarly, evaluation of anxiety in men with appropriate follow-up also is necessary. The presence of co-morbidities in men and lowered functional status in women may require additional supports or assistance in the home. Referral to cancer or RT support groups designed for younger patients of both genders may assist these patients to develop coping strategies and/or learn of other helpful resources. The nurse can be instrumental in developing racially and culturally appropriate teaching materials and resources for men of racial or ethnic minority groups.

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Knowledge Translation

- All patients need to be evaluated for depression at the initiation of RT.
- Patients who are depressed and younger, women with lower functional status, and men who are anxious, have more comorbidities, and are members of a racial or ethnic minority should be assessed for decrements in QOL at the initiation of RT.
- Knowledge of the different predictors of QOL in women and men can be used to develop gender-specific interventions to prevent decrements in QOL.

Table 1
Gender Differences in Demographics and Clinical Characteristics at the Initiation of Radiation Therapy

Characteristic	Females (n= 89)	Males (n=96)	P value
Age (Years)	<u>mean (SD)</u> 54.7 (11.9)	<u>mean (SD)</u> 66.0 (9.4)	<0.001
Education (years)	16.2 (2.7)	15.9 (3.2)	0.434
Karnofsky Performance Status	87.4 (12.6)	93.8 (9.8)	<0.001
Number of comorbidities	5.0 (2.5)	4.6 (2.5)	0.298
Marital status	<u>n (%)</u>	<u>n (%)</u>	<0.001
Married/partnered	35 (40.7)	68 (70.8)	
Not married/partnered	51 (59.3)	28 (29.2)	
Lives alone			0.026
Yes	34 (38.2)	22 (22.9)	
No	55 (61.8)	74 (77.1)	
Race			0.622
White	61 (70.1)	71 (74.0)	
Non-white	26 (29.9)	25 (26.0)	
Currently employed			1.00
Yes	38 (43.7)	41 (44.6)	
No	49 (56.3)	51 (55.4)	
Children at home			0.025
Yes	20 (24.7)	9 (11.0)	
No	61 (75.3)	73 (89.0)	
Parent at home			0.117
Yes	6 (7.3)	1 (1.2)	
No	76 (92.7)	79 (98.8)	
Cancer Diagnosis			<0.001
Breast	78 (87.6)	0 (0)	
Prostate	0 (0)	82 (85.4)	
Brain	9 (10.1)	4 (4.2)	
Lung	2 (2.2)	10 (10.4)	

Table 2
Gender Differences in Symptom Characteristics and Quality of Life Prior to the Initiation of Radiation Therapy

Symptom and Quality of Life scores	Females (n= 89)	Males (n= 96)	P value
	mean (SD)	mean (SD)	
Average daily pain *	n=39 3.5 (2.1)	n=22 3.3 (1.5)	0.667
Pain interference with activity	n=39 2.8 (2.2)	n=25 3.6 (2.3)	0.150
Trait anxiety	36.3 (11.3)	32.4 (8.7)	0.011
State anxiety	34.3 (13.0)	29.1 (8.5)	0.002
Depression	12.4 (9.4)	7.1 (7.2)	<0.001
Sleep disturbance	45.2 (21.5)	35.5 (17.1)	0.001
Fatigue - Evening	4.9 (1.8)	3.7 (2.1)	<0.001
Fatigue - Morning	2.9 (2.0)	1.9 (1.8)	0.001
Energy - Evening	4.1 (1.7)	4.8 (1.9)	0.008
Energy - Morning	5.2 (1.8)	6.2 (2.0)	0.001
Attentional function	6.6 (1.9)	7.4 (1.6)	0.001
Quality of Life – Total **	6.2 (1.6)	7.2 (1.3)	<0.001
Quality of Life – Physical well-being **	7.5 (1.9)	8.7 (1.4)	<0.001
Quality of Life - Psychological well-being **	5.7 (2.1)	7.2 (1.7)	<0.001
Quality of Life – Social well-being **	6.4 (2.5)	7.7 (1.9)	<0.001
Quality of Life – Spiritual well-being **	5.5 (2.1)	5.1 (2.1)	0.252

* Pain was reported in 42 (48.3%) women and 27 (28.4%) men (p=0.006)

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Table 3
Effect of Selected Characteristics on Females' (n=89) Total Quality of Life Scores Prior to Initiation of Radiation Therapy Females

Source	R ²	r	beta	R ² -change (sr ²)	P value
Overall	.64				<0.001
Age (years)		.40	.279	.068	0.001
Karnořsky Performance Status		.55	.313	.085	<0.001
Children at home		.40	.208	.038	0.009
Center for Epidemiological Studies -Depression score		-.58	-.469	.198	<0.001

Table 4
Effect of Selected Characteristics on Males' (n=96) Total Quality of Life Scores Prior to the Initiation of Radiation Therapy

Source	R ²	r	beta	R ² -change (sr ²)	P
Overall	.70				<0.001
Age (years)		.31	.183	.031	0.004
White		.13	.183	.033	0.003
Number of comorbidities		-.30	-.210	.041	0.001
State anxiety score		-.69	-.363	.070	<0.001
Center for Epidemiological Studies-Depression score		-.73	-.414	.089	<0.001